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THE NEW YORK STATE CANALS

THE CANAL AS A CARRIER OF COAL

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THE CANAL
AS A CARRIER OF COAL

By

W. W. WOTHERSPOON

STATE SUPERINTENDENT OF PUBLIC WORKS

A survey of the commercial possibilities of the improved canal system of New York reveals a very important feature of the canal operation that is of statewide interest; namely, the ability of the improved canals to transport a large portion of the coal, both anthracite and bituminous, consumed in this State.

At the present moment, when the coal situation is commanding nation-wide attention, any medium that offers even a partial solution of this big and vital problem is deserving of serious consideration and should be utilized in the fullest measure, whenever and wherever available.

Coal Situation Acute

The Federal Fuel Administrator recently stated that there were 20,000,000 tons of coal at the mines that could not be distributed on account of the inadequacy of railroad equipment. Prominent railroad authorities have stated that the widespread coal famine does not result so much from decreased production and increased consumption as it does from a shortage of cars.

The United States Geological Survey recently announced that soft coal operators during one week in July produced 76.5 per cent. of their capacity. The inadequacy of railroad facilities are blamed for 12 per cent. of the 24 per cent. shortage from maximum.

Problem of Distribution

It is evident, therefore, that the coal problem is a matter of distribution rather than production, and the solution must be reached by increasing the means of distribution and obtaining the greatest efficiency from present facilities.

PRESENT DISTRIBUTING METHODS

According to the United States Geological Survey, in a booklet entitled "Coal in 1915," treating with distribution and consumption, coal reaches the markets from producing areas by three general methods of transportation:

1. All rail.
2. Rail to tidewater, thence coastwise to coast ports.
3. Rail to Great Lakes, thence via lakes to lake ports.

Considering the subject from the standpoint of New York State consumers, the second and third methods may be dismissed. From the statistics published by the Geological Survey, it is shown that little of the coal routed to tidewater or to the Great Lakes comes into New York State.

SOURCES OF NEW YORK STATE SUPPLY

Of all states producing coal, it is shown by the investigation of the Geological Survey that the states of Maryland, Ohio and West Virginia were the only producing areas delivering coal in New York State markets aside from Pennsylvania.

Pennsylvania is the greatest coal-producing state in the country. Bordering New York on the south, with its mines in close proximity to the dense population and intense industrial activity in New York, it is natural that Pennsylvania coal should be consumed in great volume here.

CONSUMPTION

Statistics for 1915 show that although Pennsylvania was its own best customer, New York State ranked next, consuming more Pennsylvania coal than any other single state.

Out of a total of 157,955,137 tons of bituminous coal produced in Pennsylvania in 1915, there were over 14,000,000 tons shipped into New York State.

Pennsylvania produced 88,995,061 tons of anthracite in 1915, of which over 20,000,000 tons were shipped into New York.

This tonnage moved entirely by rail. Therefore, the first method of transportation mentioned by the Geological Survey (all rail) has been the only means of distributing Pennsylvania coal in New York.

CANAL ROUTE

With the completion of the improved canals another route and means of distribution is provided.

The canal system extends from Buffalo at Lake Erie on the west, to the Hudson river on the east. To the north, it reaches Lake Ontario at Oswego, and the St. Lawrence river through the Champlain Division, Lake Champlain and connecting Canadian waterways.

Near the exact center of the State, the Erie, or main east and west channel, makes connection with the Cayuga and Seneca Division. This section runs southward connecting Lakes Cayuga and Seneca. Watkins, on Seneca Lake, and Ithaca, on Cayuga Lake, are the two terminals of the canal system nearest the bituminous and anthracite coal fields of Pennsylvania.

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A rail haul of less than 30 miles from the New York-Pennsylvania State line makes conection with the canal system at points about equi-distant from its western, northern and eastern termini.

AVERAGE CANAL HAUL

To all that section of the State between Buffalo on the west, Oswego on the north and Albany on the east, on the line of the canal, the average water haul is 165 miles from Watkins and 143.4 miles from Ithaca.

BITUMINOUS RAIL TONNAGE

Of the 157,955,137 tons of bituminous coal produced in Pennsylvania in 1915, 83,698,389 tons were transported by rail. The Pennsylvania Railroad transported 57,059,578 tons, or about 68 per cent., and the New York Central 8,337,868 tons, or about 10 per cent. These two lines were the largest bituminous coal carriers.

ANTHRACITE RAIL TONNAGE

There are no statistics available as to the portion of Pennsylvania anthracite production transported by individual railroads but the five railroads operating from the anthracite fields of Pennsylvania and making connection with the canal system at various points between Buffalo and Albany carried 43,951,145 tons of anthracite coal in the year ended June 1916.

NEW YORK STATE BITUMINOUS RAIL TONNAGE.

It is shown by the United States Geological Survey that 14,430,879 tons of Pennsylvania bituminous coal were consumed in New York State in 1915. This is exclusive of railroad coal and bunker fuel for ocean vessels and steamships on the Great Lakes.

Since the Pennsylvania Railroad transported 68 per cent. and the New York Central 10 per cent. of the total bituminous coal mined in Pennsylvania and moved by all-rail routes to other states, it is reasonable to assume that these two roads would participate to the same degree in bituminous coal moved into New York State. On this basis, the coal tonnage of the Pennsylvania Railroad from the Pennsylvania bituminous fields into New York State would have been about 9,813,009 tons. The New York Central tonnage would have been about 1,443,000 tons, but inasmuch as it appears the Pennsylvania Railroad is the controlling factor in the movement of Pennsylvania bituminous coal, the traffic of the Pennsylvania Railroad alone will be considered.

NEW YORK STATE ANTHRACITE TONNAGE

It is difficult to estimate the anthracite tonnage that was transported into New York State by each of the five hard coal roads. The percentage of each line to the total tonnage transported, if applied to the New York State consumption would, however, give the following approximate basis:

Lehigh Valley	30.5%	6,340,795.67
Delaware, Lackawanna & Western	23.2%	4,833,162.61
Delaware & Hudson	22.5%	4,677,636.15
Erie	18.7%	3,887,635.38
New York, Ontario & Western	5.1%	1,060,264.19
	100%	20,789,404.00

RAIL ROUTES

On movement of coal from the Pennsylvania bituminous fields via Pennsylvania Railroad into New York State, by far the greatest area of the State is served by the joint Pennsylvania and

New York Central routes. The junction of the New York Central and Pennsylvania Railroads at which there is the greatest coal interchange and through which the greatest area is served is at Himrods, N. Y., a point about 15 miles south of Watkins, N. Y., the canal terminal at the southern extremity of Seneca Lake. Soft coal taken from the Pennsylvania Railroad at Himrods Junction destined to points on the line of the New York Central between Buffalo and Albany, is carried by the New York Central over its Pennsylvania Division northward to Lyons, thence east and west of Lyons to all points on the main line. This all-rail route practically parallels the canal route via the Cayuga-Seneca and Erie canals from Watkins.

The route of the anthracite movement also closely follows the route of the canal. Via the Lehigh Valley Railroad, anthracite is delivered to lines serving the territory intermediate to Albany and Buffalo at Weedsport, Geneva and Canastota, N. Y. Via Delaware, Lackawanna & Western Railroad, the point of interchange is at Syracuse and Utica. Over the New York, Ontario & Western Railroad, the interchange may be made at Oneida and Utica. Excepting Canastota and Oneida, all of the interchange points named are ports on the canal system. On Lehigh Valley traffic via Geneva, the coal is carried through Ithaca, the canal terminal at the southern extremity of Cayuga Lake.

Bituminous Producing Area

The source of the greatest bitumiuous production in Pennsylvania is said to be in the Clearfield District. Altoona, Pa., is about the geographical centre of this area.

From Altoona to that section of New York State between Albany and Buffalo and as far north as Oswego, the average rail haul is about 317 miles. On the assumption that the average car mile movement is about 20 miles per day, an average 317 mile haul would require about 30 days per car per round trip.

Canal Route Saves 5,000 Cars

An annual movement of 9,813,000 tons is an average monthly tonnage of 817,750 tons. This tonnage, on the average loading of 50 tons per car, would require 16,355 cars per month for its transportation. As it takes a car 30 days to make a round trip, that number of cars must be constantly in service between the mines and New York State points.

Suppose, however, instead of routing the bituminous coal via the all-rail route into New York, it was hauled by rail to Watkins, N. Y., and thence transported by canal into the same consuming areas.

Watkins is about 190 miles from Altoona. At 20 miles per day a car may make a round trip between Altoona and Watkins in 20 days. It requires 30 days via the all-rail route. Therefore, the same amount of coal could be transported from the bituminous fields to Watkins for distribution via canal in New York State with two-thirds the number of cars required by the all-rail movement. This car saving would amount to over 5,000 cars per month.

ANTHRACITE AREA

The Scranton-Wilkes-Barre District is about the geographical center of the Pennsylvania anthracite fields. The shortest rail mileage from the anthracite region to a point of connection with the canal via each of the five hard coal roads is:

Via Delaware, Lackawanna & Western to Ithaca..	113	miles
Via Lehigh Valley to Ithaca....................	128	miles
Via New York, Ontario & Western to Utica......	169.2	miles
Via Delaware & Hudson to Schenectady.........	194	miles
Via Erie to Rochester.........................	254	miles

As a distributing medium, the routes via the Delaware & Hudson, the Erie, and the Ontario & Western do not seem practicable insofar as the average rail and water haul to the territory between Buffalo and Albany via these routes greatly exceeds the haul through the Lehigh Valley and Lackawanna railroads connecting with the canal at Ithaca. In demonstrating the ability of the waterway to transport the anthracite tonnage, therefore, the shortest and direct routes only are taken into consideration.

13,000 CARS CONSERVED IN ANTHRACITE TRAFFIC

From Scranton to the section of the State between Albany and Buffalo and northward to Oswego, the average all-rail haul via the Lehigh Valley and Delaware, Lackawanna & Western Railroads is approximately 231 miles. On a 20-mile per day car movement a round trip would average 23 days. The anthracite tonnage under consideration aggregated 20,789,404. This represents approximately 1,732,450 tons per month. On the 50-ton per car basis, this volume would require about 34,649 cars per month. Since it takes an average of 23 days for a round trip, 26,565 cars must be constantly in service to transport this volume of tonnage.

If the anthracite tonnage were carried by rail to the point of interchange with the canal, an average rail haul of 120 miles is involved. The 20-mile per day car movement would entail 12 days per round trip. This results in a car saving of nearly 50 per cent. and would conserve over 13,000 cars per month.

RELIEF PROVIDED FOR OTHER STATES

A utilization of the canal for the transportation of anthracite and bituminous coal to the extent indicated would therefore result in a conservation of over 18,000 cars monthly, and the equipment thus conserved might transport 900,000 tons of coal per month to other territories not accessible via water routes. During the seven months season of navigation, the conservation of so large a number of cars would augment the railroad facilities to an extent greater than demand for the distribution of the 20,000,000 tons which the Fuel Administrator states cannot be transported on account of the car shortage to territories where it is sorely needed.

TON MILE SAVING

The 317 mile average all-rail haul on the annual bituminous tonnage creates a ton mileage per month of 259,226,750 ton miles. On the anthracite tonnage with an average all-rail haul of 231 miles, the ton mileage monthly would be 400,195,950 ton miles.

If the bituminous were routed via canal through Watkins, the ton mileage would be decreased to 155,372,500 ton miles. A canal routing via Ithaca on anthracite coal would decrease the anthracite ton mileage to 207,894,000 ton miles. This represents a monthly ton mile decrease of 296,156,200 ton miles and during a seven months season of navigation would total 2,073,093,400 ton miles.

Ability of Canal to Accommodate Coal Traffic

The coal traffic of the rail lines for a seven months period of canal navigation would aggregate about 17,850,000 tons. Let us consider whether the canal can physically accommodate this large tonnage volume.

The canals are limited in their capacity only by the quantity of water utilized in operating the locks. Between the Cayuga-Seneca and Erie Divisions of the improved canal system there are four locks, two combined at Seneca Falls, one each at Waterloo and Cayuga. It is known that the available water supply will permit the passing of boats through these locks at least once every half hour. The lock chambers on the enlarged canal can accommodate five of the old type 240-ton boats with their towing tug at one time. Operated 48 times a day, they may accommodate 240 boats with a carrying capacity of 57,600 tons per day. During the season of canal navigation, the Cayuga-Seneca canal is capable of transporting 12,376,000 tons or almost 75 per cent. of the total tonnage of the rail lines.

This estimate is based on the utilization of the Cayuga-Seneca canal exclusively, while it is quite probable a large coal traffic might be developed through other ports of transshipment, such as Syracuse, Utica or Weedsport, which are on the Erie Division. In view of the ability of the Cayuga-Seneca Division to transport 75 per cent. of the rail-borne coal traffic during the season of navigation, there is no question but that the remaining 25 per cent. could be cared for through other rail and canal routes. It seems evident that the improved canal system can readily accommodate the entire bituminous and anthracite coal tonnage.

Additional Benefits

It is apparent that a utilization of the canals would materially relieve the coal and car shortage, but there are still other benefits that may be realized by the diversion of this volume of coal from the rail to the canal route.

CONSERVATION OF MOTIVE POWER

Exclusive of the actual shortage of cars, the inability of the railroads to move cars promptly is a perplexing problem confronting railroad managers. It cannot be disputed that a conservation of 18,000 cars per month, made possible by the use of the canal for the coal traffic, would appreciably relieve the condition. Since an engine may haul perhaps 100 loaded coal cars, the conservation of locomotives would amount to 180 monthly. The benefits which would arise from the adoption of the plan would be almost incalculable.

RELIEVING TERMINAL CONGESTION

When every foot of track in yards and terminals is at a premium, the withdrawal of 18,000 cars per month for seven months in the year releases over 850 miles of track for other service. This is the equivalent of 850 miles of new track and its value is beyond reckoning.

SAVING IN TRANSPORTATION COST ON BITUMINOUS

The third advantage to be derived from a utilization of the canal for coal transportation and what perhaps is of the greatest interest to the consumer is the economy in transportation costs.

The average rail rate on bituminous coal from the Clearfield District to the area in New York State betwen Buffalo and New York is $2.02 per ton. For the average haul of 317 miles this rate yields a ton mile rate of 6.3 mills.

The Pennsylvania Railroad publishes a rate of $1.48 per ton on soft coal from the Clearfield District to Watkins for transshipment. This rate yields 7.7 mills per ton mile.

CANAL RATE TWO MILLS PER TON MILE

It is believed coal may be profitably transported in large volume via the canal at a rate of 2 mills per ton mile. The average water haul from Watkins being 165 miles, an average canal rate from Watkins would be 33 cents per ton. A 33 cent canal rate plus the rail rate of $1.48 from mines to Watkins makes a through charge of $1.81, exclusive of terminal charges. These are an unknown factor but should not materially increase the through charge if modern and economical transshipping machinery were provided.

Eliminating terminal charges, however, it is seen that the joint rail and canal route creates a saving in the cost of transportation per ton on bituminous coal of 41 cents and this, in spite of the fact the rail rate to Watkins exceeds the average rail rate to points between Buffalo and Albany by 1.4 mills per ton mile. If the rate to Watkins was constructed on the 6.3 mills per ton mile basis yielded by the average all-rail rate, the result would be a rate from the mines to Watkins of $1.21 and it would increase the saving in the rail and canal route to 68 cents per ton.

Anthracite Transportation Cost Reduced

The average rail rate on anthracite coal from Pennsylvania fields to the territory in question is $1.947 per ton. The average rail haul is 231 miles. This yields a ton mile rate of 8.4 mills.

The hard coal roads do not publish transshipping rates to points of interchange with the canal that are appreciably lower than the local rate as is the case via Pennsylvania Railroad from the Pennsylvania bituminous fields to Watkins, N. Y. However, if rates were put into effect from the anthracite region to Ithaca, based on the average 8.4 mills per ton mile all-rail anthracite rate, on the average rail haul of 120 miles, the result would be a rate of $1.108 per ton. A two mill per ton mile canal rate on the average canal mileage of 113 miles from interchange points to territory between Buffalo and Albany yields a rate of 22.6 cents per ton. This combination would make a through rail and canal rate of $1.334 or 61.3 cents less than the all-rail rate, exclusive of terminal charges.

The foregoing shows that the utilization of the rail and canal route would result in a saving in the transportation cost of 68 cents per ton on bituminous coal and 61.3 cents per ton on anthracite coal. On the aggregate bituminous and anthracite tonnage for the seven months this saving per ton would amount to over $11,000,000.00.

AVAILABILITY OF BOATS

The problem of supplying a sufficient number of boats is the only obstacle in the way of the immediate utilization of the rail and canal route. It, however, is not difficult of solution.

The average canal haul to the territory between Buffalo and Albany from the various possible points of transshipment is about 115 miles. Assuming boats will proceed four miles per hour, on the average, a round trip can be made in three days at the most. A movement of 17,850,000 tons of coal during the season of navigation means a daily tonnage of 85,000 tons. To transport such amount of coal each day would require 354 boats of the 240-ton type. On the basis of a three day schedule, the traffic would require the constant service of 1,062 boats. The census made by the Superintendent of Public Works during 1917 showed there were approximately 675 canal boats in service. These, to a great extent, were boats of the old type, unsuited for the carrying of grain or other high grade commodities. They are, however, well adapted for the coal trade.

NEW BOATS NEEDED

If all the present boats were utilized, the movement of the total coal tonnage under consideration would require approximately 387 additional boats of a 240-ton capacity. The type of boat required is simple in design and cheap of construction. A sufficient additional number of wooden boats could be built with little or no delay. Should the new barges be of larger dimensions a less number would be needed.

COAL TRAFFIC ONCE BIG FACTOR ON CANALS

That the industrial interests of New York State once recognized the opportunities afforded by the canal in the transportation of coal is apparent from the statistics of canal commerce of a few decades ago. Over a million and one-half tons of coal have been transported on the canals of New York in a single season.

CAUSES OF DIVERSION TO RAILROADS

Why this commerce passed from the canals to the railroads is readily explained. The first cause, no doubt, was the lack of modern and properly equipped terminals on the canal. A second factor was the convenience offered big consumers by the railroads in providing private sidetracks, thus enabling factories to unload at their plant. A third and most potent contributing cause was the inefficient and undependable service provided by the individual boat owner. Big shippers found the boat owner here to-day and gone to-morrow. When there was an urgent need of boats none were to be had. All of these expensive and unsatisfactory conditions, abetted, undoubtedly by railroad competition and discriminatory railroad rates, forced the coal traffic from the State waterways.

In the season of 1917, despite the urgent need of manufacturers and the inability of the railroads to adequately serve their needs, but 234,941 tons of coal were carried on the canals, and practically none over the Cayuga-Seneca Division.

Situation Demands Canals Be Utilized

The transportation situation now existing demands that the commercial and manufacturing interests awaken to the peril that threatens them. The railroads must be augmented by every available means of transportation if they are to survive the burden imposed on them and efficiently serve the nation at this most critical period. The improved canal system of New York State is the finest substitute for rail transportation anywhere available.

No Obstacles to Canal Use

There is no reason why a large portion of the bituminous and anthracite coal consumed in the State should not be transported by the canals. The conditions influencing the routing of coal via the rail routes have been entirely overcome in the construction of the new canal. Terminals are available for service at practically every port of the canal system. They have been or will be equipped with devices for the speedy and economical handling of the traffic. If the coal traffic warrants special machinery it can be provided. Coal may be unloaded from barges, loaded to cars and switched to industries at a comparatively small cost. The State and Federal laws provide for this.

If it could be assured that the coal consumed in New York would be routed via the canal, no reason exists why boats capable of transporting coal to the canals capacity should not be speedily constructed. Under capable management the requirements of all could be adequately and efficiently served. The coal-carrying boats, to render the maximum of service, should be under some central ownership or control. The railroads now voluntarily offer to cooperate with dependable water lines. Destructive railroad competition need no longer be feared. If rates are discriminatory, the State and Federal Commissions are empowered to take summary action.

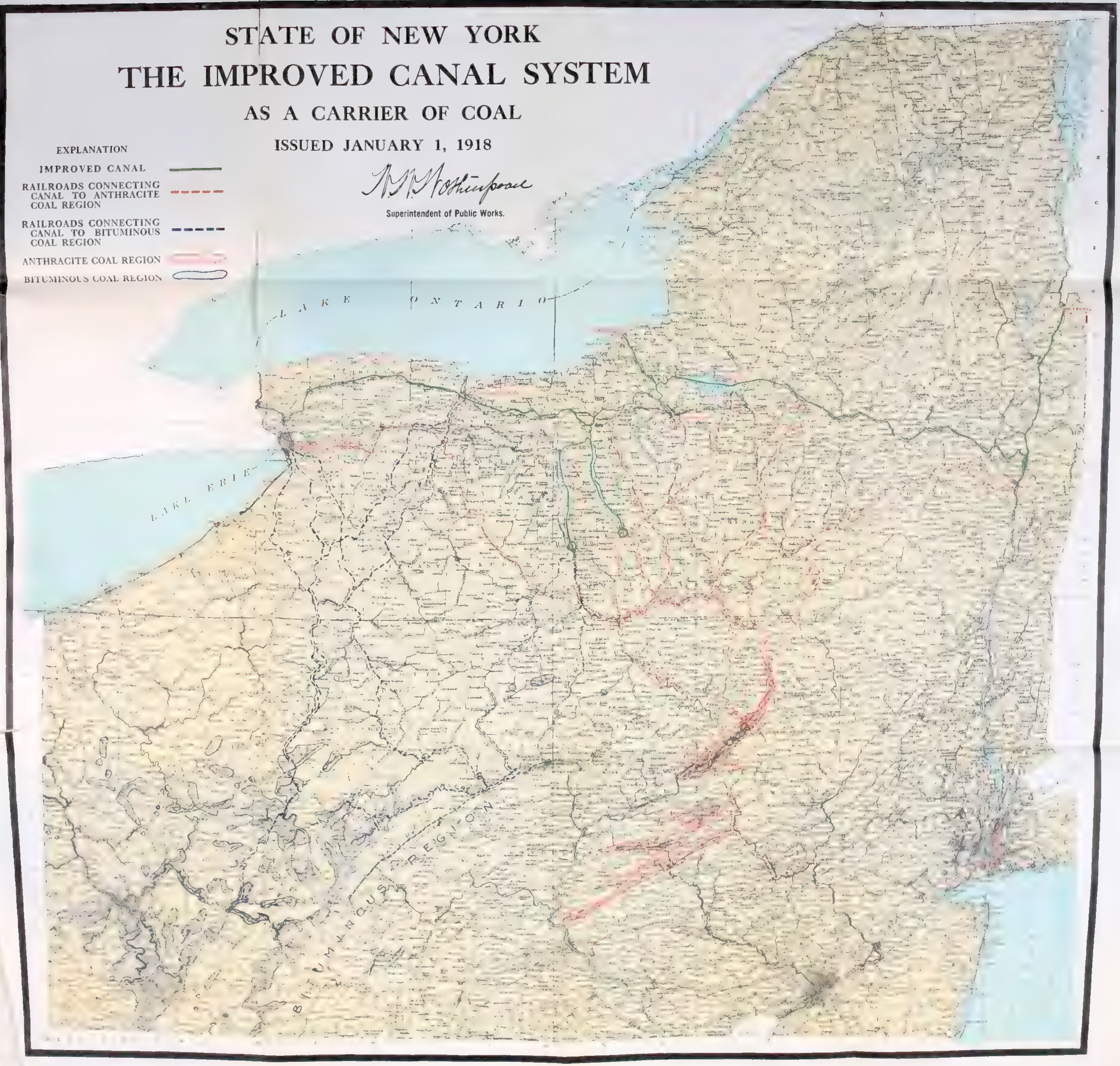
With the routing of coal through the canal assured, and with the necessary boats in existence, the only facilities then lacking would be temporary storehouses, coal trestles, or other structures or devices which would permit the cheap and prompt transfer of coal from car to barge. No difficulties exist in the providing of these facilities to men who would earnestly take up the proposition.

In the case of export coal, it is believed canal barges may transport coal from transshipping points in central New York to shipside in New York harbor, thus eliminating transshipment and lighterage now required in the exportation of coal through New York and appreciably relieving the harbor congestion.

Shippers Hold Solution

The solution of the coal problem confronting the majority of New York State industries is in their own hands. A maximum utilization of the canal facilities and the fullest measure of cooperation and support on the part of shippers is all that is necessary. In the protection of their own interests, as a measure of relief to other territories not accessible by water routes, and as a patriotic duty, the canal should be used to the very limit of its capacity. The accompanying map describes the rail and canal routes cited herein.

Albany, January 1, 1918



STATE OF NEW YORK
THE IMPROVED CANAL SYSTEM
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ISSUED JANUARY 1, 1918

W.W. Wotherspoon
Superintendent of Public Works.

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